of two to three days in the laboratory rearings. The newly-emerged adults measured on an average 0.40 mm. in length and 0.50 mm. across wings; with 15 segmented antennae and 4 segmented tarsae. The duration of the life cycle of the insect in the laboratory was found to range from 8 to 11 days.

These observations were also confirmed in the field during investigations lasting from 10th December 1953 to 23rd January 1954. During this period there were successive emergences of the insect which continued to infest the mango inflorescence on a considerable scale, thus affecting the bearing of the crop. Before working on the control of the insect, alternative host plants will have to be experimented with. The investigations are in progress and the details will be published as they are completed.

Entomological Laboratory,
College of Agriculture,
Dharwar,
January 15, 1954.

H. L. KULKARNY

23. SWARMING OF LONG-HORNED GRASSHOPPERS (*MECAPODA ELONGATA*)

On the 29th October 1954, while driving home from the city to Bandra at about 7 p.m. I saw large numbers (30-50) of *Mecapoda elongata* at each of the street lights, about 15, from the top of Cumballa Hill down to Hornby Vellard. They were also present in smaller numbers at occasional lights further northwards to Bandra. During the previous week, a few had entered my house at Bandra at night and several other people had reported similar insects entering their homes in and around Bombay.

The Zoological Survey of India to whom a specimen was sent for confirmation of identity state that this species has not been known to swarm, and this occurrence therefore seems worth recording.

On the night of 18th October while looking for frogs at Matheran (2,000 ft.) I had heard a long strident call and traced it down to one of these insects on a bush under trees about 2 ft. above ground. This may of course have no connection with the swarming.

c/o Faiz & Co.,
75 Abdul Rehman Street,
Bombay,
December 18, 1954.

HUMAYUN ABDULALI

24. LEECHES

I found the letters on leeches in your August-December issue most interesting. I cannot claim to have had long experience of these unpleasant creatures, but a few observations made in Nepal during 1952 and 1954 may be of interest. I was primarily engaged in collecting plants west and south of the great Dhaulagiri range in that country. The heavy rainfall which is precipitated on the southern flank of the range provides very suitable country for leeches to thrive in.

Two types of leech were encountered. The commonest type, which seems to correspond with the species *Haemadipsa montana* mentioned by J. L. Harrison had a very wide distribution and the vertical range was especially interesting. I found this type at 3,000 ft. which seemed more or less to constitute its lower limit, in the evergreen *Castanopsis* and *Schima* forests near the Kali Gandak River. Here a few leeches were active before the monsoon, and I was bitten in mid-April. Later they were abundant and were still active in November when I left. The other end of their altitudinal range I found was about 13,000 ft., and it came as an unpleasant surprise to have hands bitten while collecting primulas, meconopsis, potentillas, etc. in the beautiful alpine meadows. Of course the season of activity here is much shorter since the ground is frozen from October to April or May.

The most important point concerning their presence, i.e., their relative abundance or not, is, I feel intimately linked with the passage of domesticated cows, buffaloes, sheep and goats. In Central Nepal at least it seems that their distribution is dependent upon these animals. It was a familiar sight to follow a blood-stained goat track up to an alpine grazing encampment, and this leech was especially given to hiding under stones in the track and around the grazing sites. I found that if one strayed well away from the track, leeches were usually markedly fewer in number, and I was particularly interested to observe that in some cases where domesticated animals either did not use the track, or used it only in the winter months, leeches were almost absent. Above one Nepali hillside village at 8,500 ft. leeches were abundant on many of the grazed slopes, and especially frequented the densely forested ravines. Yet below the village in very moist *Tsuga* and *Quercus* forest leading down to the river bed, there were practically no leeches on the tracks and in the clearings. I was most surprised at first, since this was in the middle of the monsoon, but my Lepcha collector said that the cattle and goats only came down in the winter months when the grazings above were frozen and snow covered.

The question of overwintering is very interesting, especially at the higher altitudes. While it has occurred to me that in their uppermost limits they may die out each year, the population being renewed by the upward passage of animals in the following season, I certainly found in at least one grazing site at 11,000 ft. very active leeches in early June before any herds had arrived. I must admit that I failed to find these leeches in late October when bitter frosts were occurring, and I considered that they must descend quite deeply into the soil to hibernate. One incident linked with this question happened when I was encamped in a forest clearing at 10,500 ft. in late September. A number of leeches came into my tent at night, a most unusual occurrence with this species (I normally used a waterproof groundsheet). They were, however, not interested in me for a change, and upon inspection they seemed to be gorged or partly gorged leeches, which I rightly or wrongly assumed were trying to find a place to hibernate in.

The problem of the time which elapses between one blood meal and the next raises itself, and I think that in Nepal at any rate the five months suggested by J. L. Harrison must be extended in many cases to at least ten months, and it appears that in the higher regions that length of time would be usual. Incidentally I saw nothing to suggest that anything other than blood was consumed. Also I do not

feel that wild animals play an important part in their distribution, since the population of mammals in the upper forests at least does not seem very high. I never saw this leech attempting to climb anything but the lowest herbs, and it always attacked near ground level.

The other type I encountered was a rather larger creature of a lighter brown colour with a yellow dorsal stripe, which we called the 'tree' leech to distinguish it from the previous type. In spite of its definite climbing habits I agree with your other correspondents in that I never saw them drop from above, and the odd occasions when a gorged brute fell from my head was I am sure due to brushing against shrubs. Their sense of smell seemed almost uncanny when one's presence was noticed from a yard or two away.

I found it quite noticeable that this type did not really make its appearance in strength until the monsoon was well under way, about the end of July. Then by the end of September they had disappeared. When the weather was fine they were not troublesome except in very damp and shady ravines, but when it was raining they ascended the tall herbs and shrubs in very large numbers, so that on a narrow track it was almost impossible to avoid getting bitten. I well remember sheltering in a herdsman's shack from a particularly heavy downpour one day, when a buffalo and its calf also came along with the owner. The poor beasts were covered with 'tree' leeches, even into their eyes, and one realised what a menace they could be. This leech had a much more restricted range and I only found it between 5,000 ft. and 8,000 ft. in the wettest areas immediately south of the Dhaulagiri range. The two types inhabited the same country, although where the 'tree' leech was abundant there seemed to be fewer of the other.

To combat these creatures, i.e., mainly the ground frequenting type, I used dried tobacco leaves wrapped in my socks, and found that with puttees on I could remain reasonably free from attack. The styptic pencil I carried with me would seldom satisfactorily staunch the flow of blood from a 'good' bite. The local people who went barefoot were often bitten, and it was quite a usual sight to have my coolies come into camp with legs streaming blood. They used to often spit the juice from tobacco leaves on to the leeches, to which they were undoubtedly very susceptible.

I have been told that one should never pull leeches off, but I confess I again followed the example of the local people and my Lepcha who always pulled them off. Incidentally I observed that the 'tree' leech had a larger sucker and was more difficult to get rid of. However, unlike Col. F. M. Bailey, I have fortunately never had a bite fester, even coming down to the Indian border in rather poor condition in 1952. Also I have never noticed any irritation resulting from a leech bite.

In conclusion I should like to state that I make no claim to have solved the problems concerning leeches, for my observations have been over a very limited time, and confined to a particular area where special geographical features occur.

Royal Horticultural Society's Gardens,
Wisley, Ripley,
Woking, Surrey, W. R. SYKES
March 28, 1955.